(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 250 922**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **87108140.2**

(51) Int. Cl.4: **B65D 47/34** , B65D 83/00

(22) Date of filing: **04.06.87**

(30) Priority: **03.07.86 US 881693**

(43) Date of publication of application:
07.01.88 Bulletin 88/01

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

(71) Applicant: **Czech, Manuel**
Schillerstrasse 12
D-8405 Donaustauf(DE)

(72) Inventor: **Czech, Manuel**
Schillerstrasse 12
D-8405 Donaustauf(DE)

(74) Representative: **Patentanwälte Grünecker, Kinkeldey, Stockmair & Partner**
Maximilianstrasse 58
D-8000 München 22(DE)

(54) **Dispenser for paste-like products.**

(57) The invention relates to a dispenser for paste-like products which is characterized by a simplified metering device and a simple an low-cost construction in combination with reliable operation and high metering accuracy. The head piece of the dispenser includes a pump chamber at the top of a supply container communicating with the supply of the paste-like product within the container, the communication between the container and the pump chamber being established by a lateral opening in a guide member of the dispensing piston, the opening being surrounded by a bell-shaped sealing body defining a sealed communication space between the outlet opening of the container and the lateral inlet opening in the guide member of the dispenser piston. The dispenser piston is slidably mounted within the actuator cap of the dispenser which at the same time includes the dispensing channel. During the pressure-dispensing of the paste-like product from the pump chamber through the dispensing channel to the exterior, the actuator cap itself acts to obturate the lateral inlet opening, i.e. to interrupt the communciation between the pump chamber and the product supply in the container, so that the full dispensing pressure acts in the pump chamber and in the dispensing channel. The release of the resiliently loaded actuator cap results in the lateral inlet opening being opened, so that paste-like product may be sucked into the pump chamber from the supply container through the communication space and a central opening of the dispenser piston during the return stroke of the dispenser piston. The feeding of the product within the dispenser is thus directly controlled by the actuator cap in the manner of a slide valve. The dispenser may be used for dispensing paste-like products of any type.

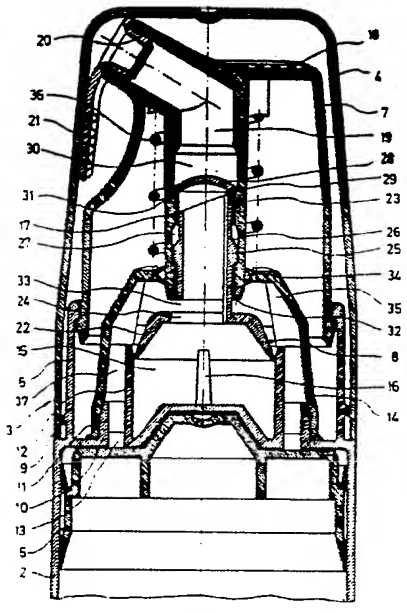

FIG 2

EP 0 250 922 A2

Dispenser for Paste-Like Products

The present invention relates to a dispenser for paste-like products, comprising a container for containing a product supply, said container having its bottom side closed by a follower piston and being provided with a head piece including a manually operable metering device comprising a dispenser piston slidably displaceable in a pump chamber by means of an actuator cap, said pump chamber being adapted to be selectively communicated with said container and with a dispensing channel, respectively, in response to displacement of said dispender piston.

Manually operable piston dispensers for creamy, flowable materials are used as portable supply containers for numerous applications, e.g. for dispensing medical or cosmetic products, for the supply of paste-like alimentary products and for metering polishes and cleaning products for instance in the domestic field.

The are numerous types of such dispenser systems in use, depending on the respective applications.

It has been found rather difficult, however, to devise a structurally simple and inexpensive handling and actuating system for dispensers of this type, which should be readily and reliably operable over extended periods of time and ensure clean and metered dispensing of the respective paste-like product.

Proposed in DE-OS 36 01 311 is a dispenser of the type defined above which functions on the pressure piston principle with the employ of a follower piston for ensuring thefeed of the paste-like product within the dispenser.

In this case, the product is supplied from a large-volume supply container to a smaller pump chamber with the aid of atmospheric pressure acting on the follower piston, when the respective dispenser piston moves upwards in a suction stroke, as a result of which the pressure in the pump chamber is lower than that in the large-volume supply container. Depression of the dispensing piston causes a non-return valve connecting the pump chamber to the large-volume supply container to be closed, and a second non-return valve in the dispensing channel of the dispenser to be opened, so that the paste-like product is dispensed from the pump chamber in response to the length of the stroke of the dispenser piston.

This basic construction of a dispenser has been found useful for dispensing paste-like products. The proper function of a dispenser of this type depends to a substantial degree on the reliable operation of the first and second non-return valves. With a view to further reducing the production costs for dispensers of this type, it is desirable to further lower the requirements and demands regarding the construction and design of the control valves for admitting the paste-like products from the supply container to the pump chamber, and from the pump chamber to the dispensing channel.

In this context, particular attention has to be devoted to the manufacturing costs required for making the dies employed for injection-molding the components of the dispenser of a plastics material as a preferred production method.

It is therefore an object of the present invention to improve a dispenser of the type defined above in such a manner that its construction is greatly simplified, particularly as regards its control elements controlling the dispensing of the paste-like product, so as to provide a compact and reliably operable construction capable of being assembled in a simple manner and of functioning reliably and with a high metering accuracy.

In accordance with the characterizing clause of claim 1 the invention attains this object by the provision that the actuating cap of the dispenser is provided with an axial tube portion in which a guide tube of the dispenser piston is received in axially displaceable coupling engagement. Additionally provided is a sealing cap defining a communication cavity communicating on the one hand with a passage opening of the container and adapted on the other hand to be communicated with the pump chamber through a controllable supply opening, the sealing cap forming a sealed passage for the tube portion of the actuating cap, the supply opening between the pump chamber and the communication cavity being adapted to be directly controlled by the tube portion of the actuator cap.

In this manner, particularly the control of the supply of the paste-like product from the supply container to the pump chamber is considerably simplified by eliminating the necessity of the previously required differential-pressure operated valve flap for metering a determined amount of the product to be fed from the supply container to the pump chamber. This results in a considerable simplification of the dispensing mechanism as a whole, and in a reduction of the production costs of the dispenser, while providing a highly compact and reliable operating mechanism for the dispenser. According to the subject matter of the invention, the supply of the paste-like product from the supply container to the pump chamber is no longer controlled, as it was formerly, by the pressure difference between the pump chamber and the supply container, but in a rather more advanta-

geous manner by closing the respective communication passage directly on depression of the actuator cap and the resultant displacement of the dispenser piston for the dispensing stroke. In a corresponding manner, the opening of this passage during the suction stroke of the dispenser piston is directly controlled by the displacement of the actuator cap and the dispenser piston relative to one another. Further advantageous aspects of the invention are detailed in the subclaims.

An embodiment of the invention shall now be described in detail by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a diagrammatical view of a dispenser in a longitudinal section, and

fig. 2 shows an enlarged longitudinal sectional view of a head piece of the dispenser of fig. 1.

Diahrammatically shown in fig. 1 is a longitudinal sectional view of a dispenser 1 for paste-like products, for instance toothpaste. The main components of dispenser 1 include a cylindrical container 2, a head piece 3 connected to the top of container 2, a closure cap 4 covering the top of container 2 including head piece 3, and a follower piston 5 slidably supported in container 2. Head piece 3 is defined by a cylindrical outer guide section 6 supporting an actuator cap 7. All of the components of dispenser 1 are preferably made by injection-molding a suitable plastics material, particularly polyethylene or polypropylene, so that dispenser 1 is of lightweight construction while avoiding any reaction between the paste-like product contained in container 2 and the material of dispenser 1. Follower piston 5 acts to feed the paste-like product from the interior of supply container 2 to a metering device 8 forming the essential portion of head piece 3. In this manner, the product in container 2 is alsways subjected to the pressure of the ambient atmosphere acting on the bottom face of follower piston 5. As a result, the dispensing of the product from dispenser 1 causes follower piston 5 to be automatically moved upwards in the fed direction, so that container 2 is incrementally emptied on actuation of metering device 8 of the dispenser. This ensures a simple feeding of the paste-like product within dispenser 1 to metering device 8 in head piece 3. At the same time this arrangement is effective to avoid the occurrence of a vacuum within container 2 on dispensing the paste-like product from dispenser 1, as well as the entry of ambient air into the interior of the container.

Outer guide section 6 of head piece 3 is slightly offset radially inwards with respect to the cylindrical wall of container 2, an exterior threaded collar forming a seat for closure cap 4 to be positioned on container 2 in axial alignment therewith, so that dispenser 1 as a whole has a smooth and uniform outer shape.

The construction of head piece 3, and in particular of metering device 8 is more clearly evident from fig. 2, showing an enlarged illustration of the head piece 3 of fig. 1 with closure cap 4 positioned thereon.

As shown in this figure, outer guide section 6 including threaded collar 9 for threaded engagement of closure cap 4 on its outer periphery is integrally connected to an end wall 10 forming the upper boundary of container 2. Proceeding radially inwards, end wall 10 is provided with coaxial annular projections 11, 12 defining one or several passage openings 13 to the interior of container 2 therebetween. Annular projection 11 is of a smaller axial length than annular projection 12 and has its outer periphery formed as a sealing seat for a bell-shaped sealing cap 14 to be described in detail as the description proceeds. Inner annular projection 12 is formed as an annular wall of a pump chamber 15 as an important element of metering device 8. A bottom portion of pump chamber 15 is formed integrally with end wall 10 in the shape of a frustoconical elevation projecting upwards into pump chamber 15 so as to ensure the substantially complete dispensing of a product supply introduced into the pump chamber. Also for ensuring substantially complete dispensing of the paste-like product from dispenser 1, the bottom portion of pump chamber 15 is formed with a centrally located pin 16 extending axially upwards.

Fig. 2 shows follower piston 5 in its upper end position in which it abuts end wall 10, and in which the paste-like product has been completely discharged from container 2. Corresponding to the shape of the bottom portion of pump chamber 15 which at this location forms the upper closure of the interior of container 2, follower piston 5 is integrally formed with a central frustoconical projection adapted in the upper end position of follower piston 5 to conform to the concave configuration of the lower surface of the bottom portion of pump chamber 15 so as to ensure substantially complete emptying of container 2.

As already stated above, outer guide section 6 also serves as a sliding seat for the axial displacement of actuator cap 7 retained thereon by the engagement of a projection, so that actuator cap 7 cannot be removed from guide section 6 while being slidingly displaceable thereon in an axially downward direction.

Actuator cap 7 is of a cup-shaped configuration and integrally connected to an inner tube portion 17 coaxial with actuator cap 7 at a central location thereof. The bottom wall of actuator cap 7 defines the axially upper end of the assembled dispenser and is formed with slip-preventing grooves 18. Tube portion 17 is angled outwards adjacent the bottom wall of actuator cap 7.

With its interior diameter tube portion 17 defines an outlet channel of dispenser 1, i.e. the paste-like product is dispensed directly through actuator cap 7 on depression thereof.

For avoiding entry of ambient atmosphere into the interior of tube portion 17, the outlet opening of dispensing channel 19 may be closed by a removable closure member 20 formed with a grip element 21 for facilitating its insertion into dispensing channel 19 and its removal therefrom for use of dispenser 1.

The lower end portion of central tube portion 17 of actuator cap 7 facing towards container 2 acts as a mounting portion for a dispenser piston 22 of metering device 8. To this purpose, a guide tube 23 of dispenser piston 22 is slidably received in tube portion 17. Dispenser piston 22 is formed as a hollow conical member having a lower peripheral sealing edge formed by the cuneiform convergent cross-section of dispenser piston 22 and disposed in sealingly sliding engagement with the interior surface of the annular wall of pump chamber 15, i. e. with the inner wall surface of annular projection 12.

Guide tube 23 is integrally connected to dispenser piston 22, with the inner tubular cross-section of guide tube 23 extending through dispenser piston 22 itself, so that the latter has an opening 24 through which pump chamber 15 communicates with guide tube 23 from below dispenser piston 22.

For retaining dispenser piston 22 in tube portion 17 by means of its integral guide tube 23, tha latter has its outer periphery formed with a circumferential annular projection 25 defined in the axial direction by suitable shoulders 26. This annular projection acts as an engagement element positively retained in a first cylindrical recess 27 in the interior wall surface of tube portion 17. Upper and lower annular shoulders defining the first cylindrical recess are inclined in a manner corresponding to the inclination of shoulders 26 of annular projection 25 on guide tube 23.

The axial length of first cylindrical recess of tube portion 17 is greater than that of annular projection 25 on guide tube 23, thus permitting a sliding displacement to occur between tube portion 17 and guide tube 23.

The end of guide tube 23 facing towards the downstream end of dispensing channel 19 is formed with an inclined end face. The thus formed pointed end portion of guide tube 23 is hingedly connected to a valve flap 28 formed integral therewith.

Dispenser piston 22, guide tube 23 and valve flap 28 are preferably made as a unitary injection-molded plastics structure.

Valve flap 28 is hingedly connected to guide tube 23 by a connection strip 29 and formed in the manner of a spherical wall section. In association with valve flap 28, a second cylindrical recess 30 formed in tube portion 17 above first cylindrical recess 27 provides an inclined annular seat surface 31 for supporting a complementary sealing edge of valve flap 28 thereon.

Guide tube 23 is received in tube portion 17 in such a manner that the distance between annular projection 25 of guide tube 23 and the rear face of dispenser piston 22 is greater than the length of the respective end portion of tube portion 17 surrounding guide tube 23. Due to the provision of this distance the lower end edge 32 of tube portion 17 is disposed opposite the rear face of dispenser piston 22.

In this case, the above defined distance at the same time establishes a limit for the maximum opening width of a slot 33 formed in the wall of guide tube 23 and leading to a lateral opening of metering device 8. As will be explained as the description proceeds, slot 33 thus forms an entry opening for the paste-like product from container 2 into pump chamber 15 via opening 24 of dispenser piston 22.

The active parts of metering device 8, i. e. pump chamber 15 with dispenser piston 22 and its mounting in tube portion 17 of actuator cap 7, and including passage opening 13 in end wall 10 of container 2, are sealingly enveloped by bell-shaped sealing cap 14, to which purpose the latter is sealingly mounted on end wall 10 so as to surround annular projection 11, while its upper portion is formed with a passage 34 for tube portion 17 to extend therethrough in a sealing slide fit. To this purpose sealing cap 14 is provided with a pair of sealing lips adjacent passage 34. Further sealing lips are integrally formed adjacent end wall 10, and annular projection 11 is provided with an annular sealing collar (not shown in the drawings) sealingly engaging the interior wall surface of sealing cap 14.

For achieving a good sealing effect, sealing cap 14 should be made of a soft elastic plastics material or of a durable rubber-elastic material.

For ensuring sufficient form stability, an upper portion of sealing cap 14 above pump chamber 15 is formed with stiffener ribs 35 supported on the upper rim of annular projection 12, i.e. of the an-

nular wall of pump chamber 15. This results in a sufficient stiffness of sealing cap 14 in the axial direction, which is important in view of the fact that the substantially horizontal top surface of sealing cap 14 has to support a return spring 36 effective to bias actuator cap 7 upwards to its rest position defined by engagement with outer guide section 6.

Bell-shaped sealing cap 14 thus defines a sealed annular communication space 37 by way of which the interior of container 2 communicates with pump chamber 15, and thus with dispensing channel 19, via the at least one passage opening 13, for instance one or more annular slot sections formed in end wall 10, slot 33 and opening 24 of dispenser piston 22.

The above described dispenser 1 operates as follows:

Be it assumed that follower piston 5 is in its lowermost position, that container 2 is filled with a paste-like product to be dispensed, and that communication space 36 including pump chamber 15 are likewise filled with the paste-like product.

As actuator cap 7 is now depressed against the biasing force of return spring 36 to be displaced axially downwards on outer guide section 6, tube portion 17 of actuator cap 7 is moved downwards by a distance corresponding to the axial length of first cylindrical recess 27, while dispenser piston 22 including guide tube 23 is kept stationary by the action of frictional forces and by the resistance offered by the mass of the paste-like product contained in pump chamber 15. Simultaneousyl with the downward movement of tube portion 17, annular seat surface 31 moves away from the associated sealing edge of valve flap 28, which is then only retained on guide tube 23 by its connection strip. The displacement of tube portion 17 relative to guide tube 23 at the same time results in the obturation of slot 33 in the manner of a slide valve control, whereupon end rim 32 comes into contact with the rear face of dispenser piston 22 to act as an actuator element for dispenser piston 22. The stroke of this displacement corresponds to the difference between the axial lengths of annular projection 25 and first cylindrical recess 27, so that substantially at the same time the upper end of first cylindrical recess 27 comes into contact with upper shoulder 26 of annular projection 25. Further depression of actuator cap 7 subsequently results in synchronous downwards displacement of dispenser piston 15 to thereby reduce the volume of pump chamber 15.

It need not be mentioned, of course, that closure member 20 has been removed from the outlet opening of dispensing channel 19 prior to actuation of dispenser 1.

Due to the obturation of slot 33, and assisted by the conical interior controus of dispenser piston 22 corresponding to the configuration of the bottom portion of pump chamber 15 including central pin 16, the paste-like product contained in pump chamber 15 is now displaced inwards from the peripheral zones of pump chamber 15 and upwards through opening 24 of dispenser piston 22 into guide tube 23, whereby valve flap 28 is swivelled to an open postion, permitting a metered amount of the paste-like product to enter dispensing channel 19 and to be dispensed therefrom: The complementary configuration of the hollow-cone dispenser piston and of the bottom wall portion of pump chamber 15 including central pin 16 is conducive to a complete emptying of pump chamber 15 during a full pressure stroke, and to the establishment within oump chamber 15 of a determined direction of flow, whereby portions of the paste-like product contained in the lower peripheral zones of the pump chamber are reliably expelled at the end of the dispensing stroke. The central pin 16 is also effective to avoid an accumulation of the paste-like product in the central area of the bottom of the pump chamber, and to assist the entry of the paset-like product into guide tube 23, i.e., onto the end of dispensing channel 19.

As the downwards displacement of actuator cap 7 is terminated by relieving the exterior actuating force acting thereon, return spring 36 acts to return actuator cap 7 upwards to its initial postion, while dispenser piston 22 is initially kept stationary by the friction acting between the sealing edge of dispenser piston 22 and the interior wall surface of pump chamber 15, i.e. annular projection 12, so that at the beginning of the return movement of actuator cap 7, tube portion 17 moves upwards relative to guide tube 23 and dispenser piston 22 by a distance corresponding to the difference in axial length between annular projection 25 and first cylindrical recess 27, until the lower shoulder of the annular projection comes into contact with the lower shoulder of first cylindrical recess 27, whereupon the dispenser piston follows the upwards movement of actuator cap 7. In this manner the obturation of slot 33 by tube portion 17 is cancelled before dispenser piston 22 starts moving upwards. At the same time, annular seat surface 31 of second cylindrical recess 30 in tube portion 17 comes into contact with valve flap 28, whereby the latter is returned to its closed position in sealing engagement of its peripheral rim with annular seat surface 31 of second cylindrical recess 30. This actuation of the valve flap is assisted by the paste-like product remaining within dispensing channel 19 above valve flap 28 at the end of the dispensing opera-

tion, as the vacuum created within pump chamber 15 by the return stroke of the actuator cap tends to suck the remaining product back into the pump chamber.

The vacuum created in pump chamber 15 by the return movement of dispenser piston 22 as a result of the return movement of actuator cap 7 by the action of return spring 36 in combination with the described simultaneous opening of slot 33 results in that, assisted by the atmosphreic pressure acting on follower piston 5, a further charge of the paste-like product is sucked into pump chamber 15 via opening 13, communication space 34, slot 33 and opening 24 of dispenser piston 22, so that pump chamber 15 is again filled with the paste-like product preparatory to the nect dispensing stroke.

The control of slot 33 is thus established in a particularly favourable manner by the sliding fit of guide tube 23 in tube portion 17 to function on the principle of a slide valve control, to thereby achieve a greatly simplified construction and reliable operation of the dispenser itself and its valve control means.

The descibed dispenser is characterized by the lateral entry of the paste-like product from container 2 into pump chamber 15, from which metered amounts of the paste-like product are dispensed through the dispenser piston 22 and centrally through the actuator cap.

All of the components of dispenser 1, with the exception of return spring 36 are made as injection-molded plastic parts.

The described embodiment of the dispenser may of course be modified in various manners without sacrificing the simple basic construction thereof, particularly as regards its valve control. It is thus possible to employ separate sealing rings adjacent passage 34, or to insert a separate non-return valve in place of valve flap 28. It is also envisaged, for instance, to mount pump chamber 15 on end wall 10 in the form of a separate sleeve member.

The dispenser is characterized by an uncomplicated construction, and in particular, by a simplification of the metering device with regard to the required valve control between the supply container and the pump chamber, and between the pump chamber and the dispensing outlet, and offers a high degree of reliability in the accurately metered dispensing of paste-like products of any type, such as pharmazeutical creams and ointments, paste-like alimentary products, e.g. mustard, ketchup and the like, or cleansing and other treatment compositions for cosmetic uses as well as for use in the domestic and automotive maintenance fields.

Claims

1. A dispenser for paste-like products, comprising a container for containing a product supply, said container having its bottom side closed by a follower piston and being provided with a head piece including a manually operable metering device comprising a dispenser piston slidably displaceable in a pump chamber by means of an actuator cap, said pump chamber being adapted to be selectively communicated with said container and a dispensing channel, respectively, in response to displacement of said dispenser piston, characterized in that said actuator cap (7) is provided with an axial tube portion (17) in which a guide tube (23) of said dispenser piston (22) is received in axially displaceable coupling engagement, and a sealing cap (14) defines a communication cavity (37) communicating with a passage opening (13) of said container (2) and adapted to be selectively communicated with said pump chamber (15) through a controllable supply opening (33), said sealing cap (14) forming a product-tight passage (34) for said tube portion (17) of said actuator cap (7), said supply opening (33) between said pump chamber (15) and said communication cavity (37) being adapted to be directly controlled by said tube portion (17) of said actuator cap (7).

2. A dispenser according to claim 1, characterized in that said dispenser piston (22) is formed as a cup-shaped annular body having a central opening (24) in its bottom portion, and is of integral construction with said guide tube (23).

3. A dispenser accoridng to claim 1, characterized in that said guide tube (23) is provided with an annular projection (25) received in a first cylindrical cavity (27) within said tube portion (17) of said actuator cap (7), the axial length of said cylindrical cavity (27) being greater, preferably twice as great as the axial length of said annular projection (25) of said guide tube (23).

4. A dispenser according to claim 1, characterized in that the upper end of said guide tube (23) facing away from said dispenser piston (22) is integrally provided with a valve flap (28) hingedly connected to the preverably bevelled edge of said guide tube (23) and adapted in a closed position to be supportingly engaged with an annular seat surface (31) of a second cylindrical cavity (30) of the tube portion (17) of said actuator cap (7).

5. A dispenser according to claim 1, characterized in that said supply opening is formed as a slot (33) in the wall of said guide tube (23) at the end portion thereof facing towards the dispenser piston, said slot being adapted to be opened and closed, respectively, by an end portion of the tube portion (17) of said actuator cap (7) facing towards said piston.

6. A dispenser according to claim 1, characterized in that said passage (34) of said sealing cap (14) is formed with a twin lip seal acting as a sliding seat for said tube portion (17) of said actuator cap (7).

7. A dispenser according to claim 1, characterized in that said tube portion (17) of said actuator cap (7) cooperates with said central opening (24) of said dispenser piston (22) and said guide tube (23) to form said dispensing channel (19), said dispensing chanel being angled outwards in a bottom portion of said actuator cap (7).

8. A dispenser according to claim 7, characterized in that a separate closure member (20) integrally provided with a grip element (21) is inserted into an outlet opening of said dispensing channel (19).

9. A dispenser according to claim 1, characterized in that a top surface of said sealing cap (14) forms a seat for a return spring (36) having its opposite end engaged with a bottom portion of said actuator cap (7) and coaxially surrounding said tube portion (17).

10. A dispenser according to claim 1, characterized in that the upper end portion of said container (2) is substantially closed by an upper end wall (10) providing at least one passage opening (13) and integrally formed with an outer guide section (6) acting as a sliding seat for said actuator cap (7), and in sequence radially inwards, with a first annular projection (11) and a second annular projection (12).

11. A dispenser according to claim 10, characterized in that said first and second annular projections (11, 12) define annular openings acting as said passage openings (13) in said end wall (10) of said container.

12. A dispenser according to claim 10, characterized in that the radially inner second annular projection (12) forms said pump chamber (15).

13. A dispenser according to claim 10, characterized in that said first annular projection (11) forms a mounting seat for said sealing cap (14).

14. A dispenser according to claim 1, characterized in that said tube portion (17), said dispenser piston (22), said pump chamber (15) and said sealing cap (14) are disposed in coaxial symmetric alignment with respect to the longitudinal center axis of the dispenser (1).

15. A dispenser according to claim 14, characterized in that a contour of the bottom of said pump chamber (15) conforms to the cup-shaped opposite contour of said dispenser piston (22) and is provided with a central pin (16) projecting therefrom in the direction of said dispenser piston.

16. A dispenser according to claim 15, characterized in that said dispenser piston (22) as well as the bottom of said pump chamber (15) are formed with corresponding inclined boundary surfaces for reducing a flow resistance.

17. A dispenser according to claim 1, characterised in that said sealing cap (14) is provided with stiffener ribs (35) for the support of said passage (34) at an upper rim of said second annular projection (12) forming said pump chamber (15).

18. A dispenser according to claim 1, characterized in that said container (2) is formed as a cylindrical body adapted to have a closure cap (4) covering said actuator cap (7) screwed thereonto.

19. A dispenser according to claim 1, characterized in that said actuator cap (7) is displaceably and lockably guided on an inner surface of said guide section (6), and said closure cap (4) is retained on the outer surface of said guide section (6).

20. A dispenser according to claim 1, characterized in that said follower piston has a central projection adapted in an upper end position of said follower piston to be received in a complementary recess formed by the bottom of said pump chamber (15).

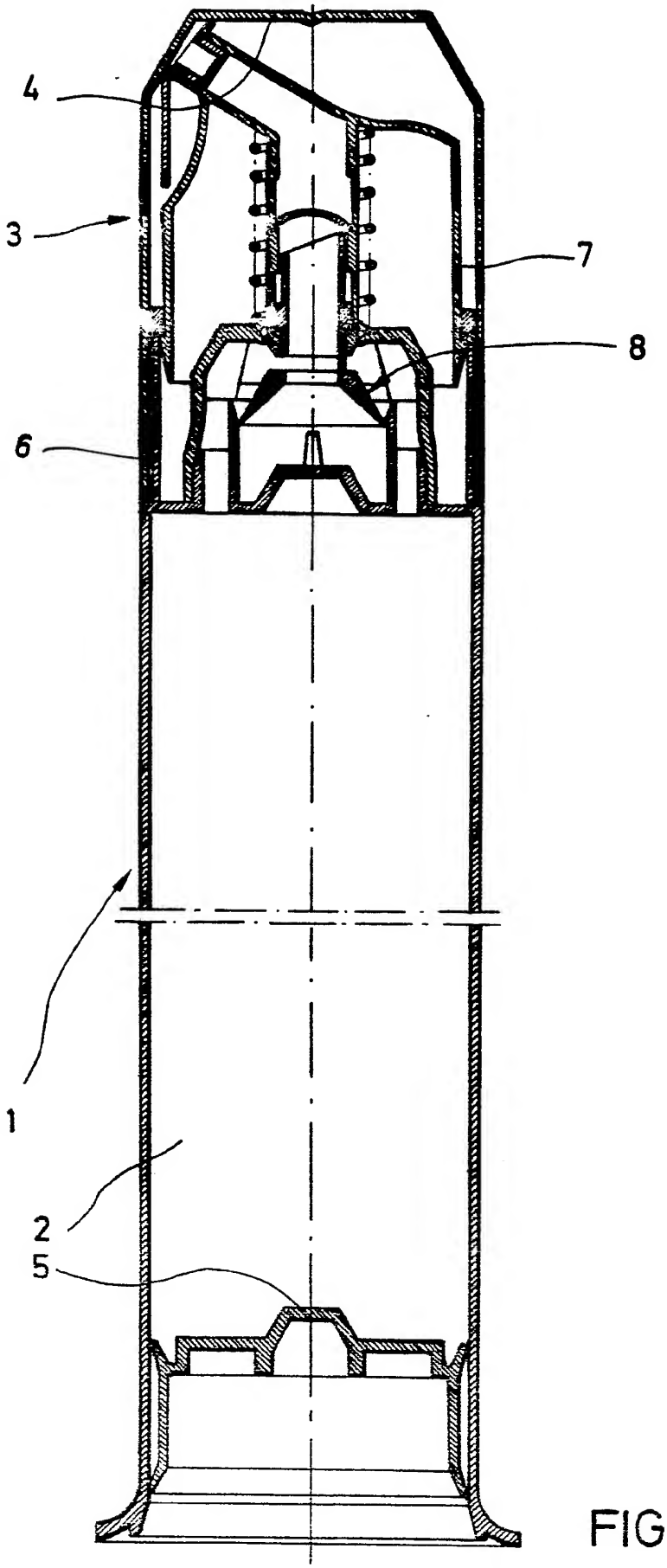

FIG.1

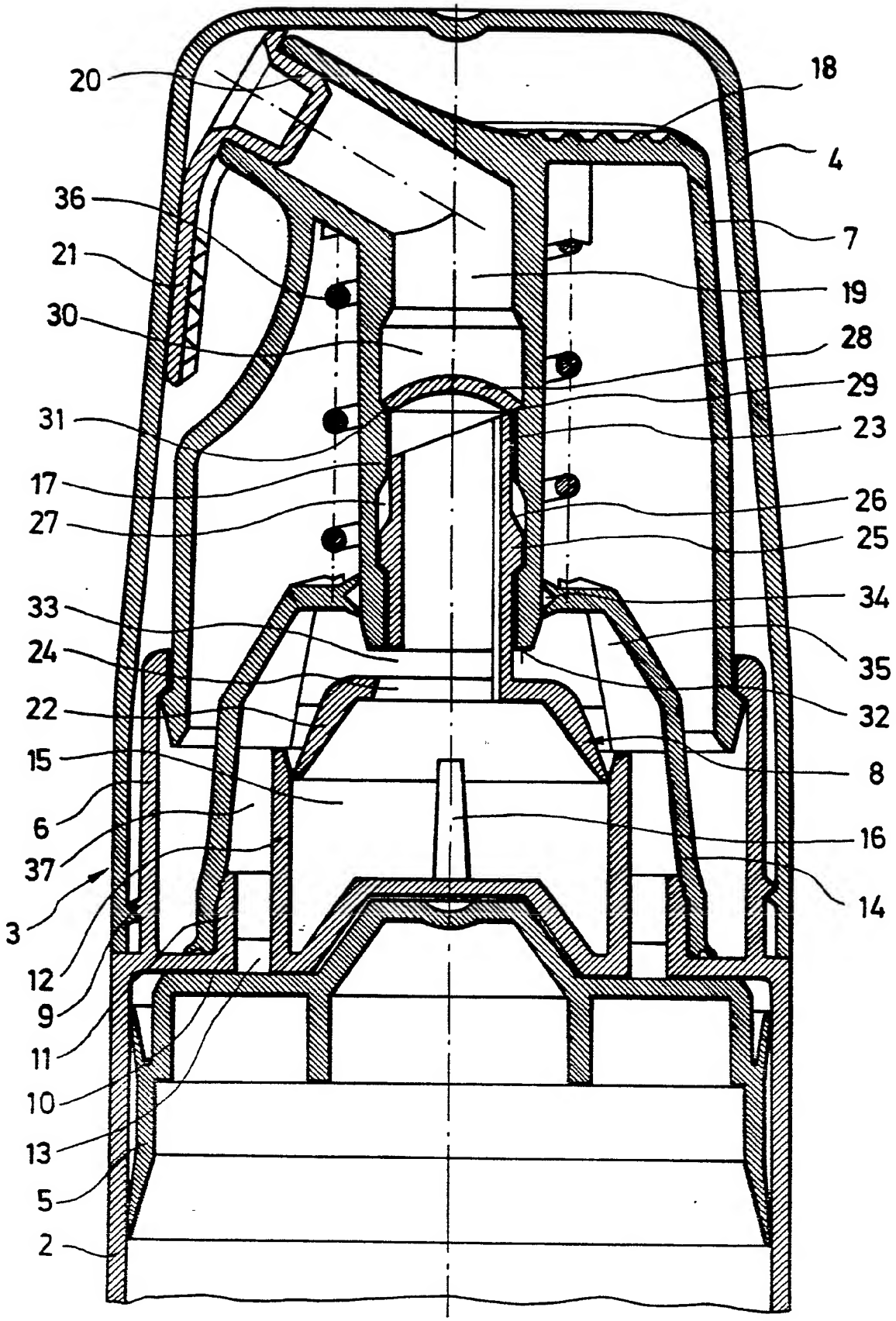
20
18
4
36
7
21
19
30
28
29
31
23
17
26
27
25
33
34
24
35
22
32
15
8
6
16
37
14
3
12
9
11
10
13
5
2

FIG. 2